Characteristics of an excellent orthodontic residency program

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Introduction: Although unquantifiable features, such as faculty passion and dedication to teaching, play a vital role in defining the quality of residency education, determinable features that are fundamental to the definition of a "top tier" orthodontic residency program also exist. The objective of this study was to identify those features. **Methods:** A survey with 32 items was developed and validated to assess the features of an excellent orthodontic program based on the following 3 major domains: faculty, education, and resident/graduate student/alumni. The survey was sent to 62 orthodontic residency programs in the United States. **Results:** Thirty-nine programs (63%) completed the survey. Recurring attributes that were identified in what constitutes an excellent program included the following: an adequate number of full-time clinical orthodontic faculty, with each member providing 1 day per week clinic coverage. The average of all respondents was 4, and the range was 1-6; a healthy mix of part-time faculty members with ≥1 full-time faculty member who monitors every clinical session; 80% full-time faculty members who are American Board of Orthodontics (ABO) certified; a craniofacial faculty member; 4 residents/graduate students per each faculty member who covers a clinical session; resident/graduate student exposure to a wide range of treatment modalities and appliances; approximately 70 new case starts per resident/graduate student (50%-60% of patients who are started are debonded by the starting resident/graduate student); patients with craniofacial anomalies and orthognathic surgery patients should be started by each resident/graduate student; 1.5 operatory chairs per resident or graduate student; 1 dental assistant per 4 residents/graduate students; 1 laboratory person; 1 receptionist/secretary per 4 residents; 100% of residents/graduate students successfully completing ABO written examination upon graduation; 60% of residents/graduate students obtaining ABO certification within 5 years of graduation; 50% of residents/graduate students presenting at national meetings would be ideal; and 50% of living alumni contributing financially to the department during the past 5 years. **Conclusions:** Based on the responses from the majority of the US orthodontic residency programs, this study has identified certain features that educators feel are ideal for an excellent orthodontic program. (Am J Orthod Dentofacial Orthop 2019;156:522-30)

There are many outstanding orthodontic residency programs in the United States that provide an excellent education to their resident doctors.[1] The outcome of this education is a high level of care provided to the patients these doctors treat. However, in all programs, there is room for improvement. Over the past decade, there has been a steady increase in the number of candidates seeking admission into orthodontic residency programs. There has also been an increase in the number of orthodontic residency programs in the United States,[2] and many orthodontic educators feel that current orthodontic residency program educational standards are minimal and do not provide an incentive for programs to achieve excellence.[3]

We propose another form of program incentives, one driven by the candidate seeking admission into residency programs. Assume for a moment that you are a candidate. You interview at several schools and find that you enjoy interviewing at each. Everyone is friendly and courteous. You may even have a relative who is an alumnus and booster for one of the programs. However, when you must finally rank each program in the order of where you would most like to attend, you discover that you lack hard data on which

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All authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest, and none were reported.
This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.
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Submitted, June 2018; revised and accepted, October 2018.
0889-5406/$36.00

https://doi.org/10.1016/j.ajodo.2018.10.026

to base your decision. Other than feelings or your relative's suggestions, you are really at a loss in knowing which programs are educationally "excellent." Now, let us repeat this interview process experiment. However, this time, assume that you carry into each interview a list of features describing an excellent program. Furthermore, assume that this list of quantified features was established by the orthodontic educators themselves. By using this data, you can rank the programs in terms of the quality of education they will provide. You can evaluate different programs. Equally important, as program directors witness their candidates using these features to evaluate the programs, they may be inclined to note areas in their program they can strengthen, and in doing so, bolster the education they provide. Everyone wins. The candidates win by getting access to hard data to make thoughtful program rankings. Programs win by having hard data to identify areas where they need to improve. Moreover, the specialty wins because doctors are graduating from stronger programs with stronger educations.

The purpose of this study was to establish quantified features that orthodontic department chairs/program directors consider to be the characteristics of an excellent program.

MATERIAL AND METHODS

Institutional review board (irb) approval

The present study provides a survey based analyses that sought the opinions of the chair/program directors of orthodontic residency programs in the United States. No personal identifiers were collected. The present study was granted "IRB Exempt" status by the Office of Human Subjects Protection Office of The University of Iowa (IRB protocol # is 201705788).

Design and validation of survey

Focus group interviews of full-time faculty at the University of Iowa Orthodontic Department were conducted by 2 authors (VA and TES). The opinions of participants were sought on what attributes should be captured in determining an "excellent orthodontic residency program." A qualitative content analysis was conducted, and recurring themes were identified.[4] A preliminary survey instrument was developed based on the attributes that need to be examined to determine an excellent orthodontic residency program. The preliminary survey instrument was validated and sent to 2 orthodontic residency program directors/chairs at other universities. Based on their feedback, the survey instrument was further modified, and the final version developed.

Survey instrument

The survey instrument (Fig) comprised 32 items grouped under 3 broad domains: faculty (8 items), education (14 items), and residents, graduate students, and alumni (10 items). The responders (department chair/program director of an orthodontic residency program) were asked 32 open-ended questions, and the responders were given the option of adding "other comments." The survey was sent to 62 orthodontic residency programs in the United States. Initially, an e-mail and a phone call were placed to describe the study objectives and participation was sought. After consent was obtained during the phone call, the survey instrument was e-mailed to the participant. Up to 3 e-mails and telephone calls were placed to each program over the course of the data collection period.

Analytic approach

The survey responses were collected and entered into an Excel datasheet (Microsoft, Seattle, Wash), which was then imported into an SPSS (IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY) dataset for descriptive statistics. The content of the responses was analyzed by 2 investigators (VA and TES). Descriptive statistics were used to summarize the numerical responses, while a qualitative content analysis was conducted of recurring themes of open-ended items.

RESULTS

Out of the 62 orthodontic programs that were contacted, 39 programs (department chair/program director) completed the survey. The response rate was 63%.

Responses from faculty domain

Table I summarizes the responses of 8 items that capture the "Faculty" domain.

1. *Number of full-time clinical orthodontic faculty members (40 hours per week)*: Respondents stated that the "number" of full-time "clinical" faculty members would be dependent on a wide range of factors such as the number of residents/graduate students in a program, duration of a residency program, and the extent of predoctoral orthodontic component. The range opined was from 1-6 full-time faculty members. From a content analysis of the responses, it was gleaned that the mean from all responses was 4 full-time clinical orthodontic faculty members. This mean was suggested so that all residents/graduate students can have exposure to a broader range of research topics and clinical

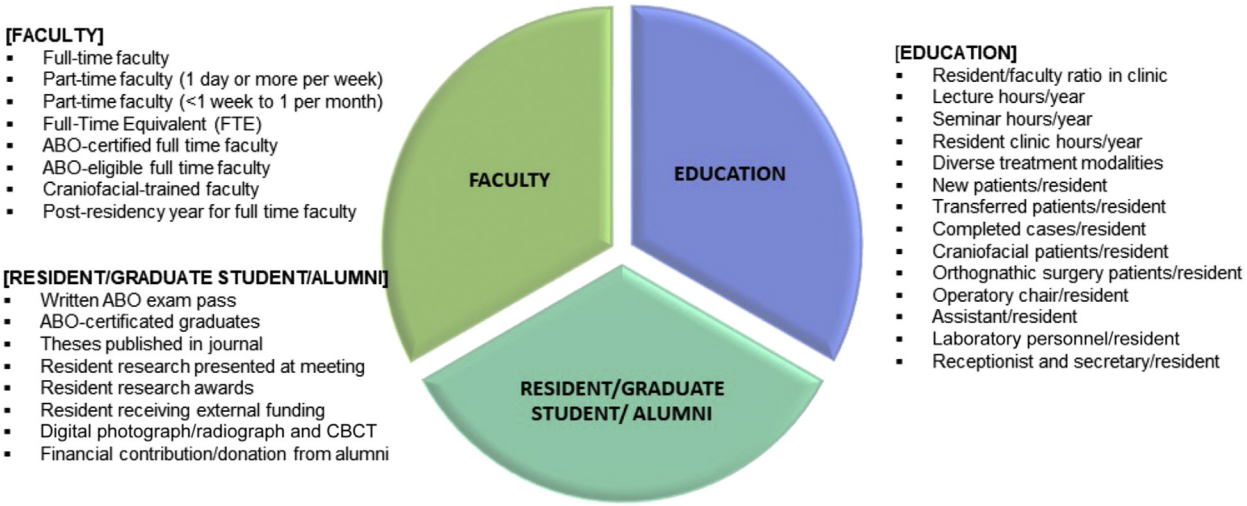

Fig. Criteria to define an "excellent orthodontic program."

Table I. Responses on faculty domain

Item	*What should an excellent orthodontic program have? (mean numbers)*
Number of full-time orthodontic faculty	≥4
Number of part-time orthodontic faculty members (≥1 d/wk)	5 part-time faculty members with >1 part-time faculty member supervising residents/graduate students during every session in a clinic
Number of part-time orthodontic faculty members (<1 d/wk and ≥1 d/mo)	10 is recommended for a top tier orthodontic program
Number of FTE faculty members	≥6
Percentage of ABO certified full-time orthodontic faculty	≥80%
Percentage of ABO eligible full-time faculty	≥80% of full-time faculty (that are not board certified yet) that are ABO eligible and are working toward ABO certification
Number of craniofacial trained orthodontists	≥1
Average number of years post-residency for full-time faculty members	12 y

expertise. Respondents indicated that each full-time faculty member should provide 1 day per week clinic coverage. Some of the open-ended comments made by the respondents included:

"3-5 faculty members-depending on size of class, duration of program, and whether a pre-doctoral dental program is offered."
"5 faculty members-diversity of clinical and research focused full-time faculty who will also contribute to administrative duties such as chair, postdoc program director, graduate clinical director, pre-doc director, and research director are needed."
"3 faculty members-minimum for a 12-15 total enrollment program where program director, research director [not a clinician] and clinic director are distinct functions."

2. *Number of part-time clinical orthodontic faculty members (≥1 day per week)*:the responders stated that the number of part-time orthodontic faculty members must also depend on the number of residents/graduate students and the number of full-time faculty members. Responders suggested that at least >1 part-time faculty member should supervise residents/graduate students during every session in a clinic. The range of responses was from 0-16. Some of the open-ended comments were as follows:

"At least one/day at minimum depending on class size and duration of program."
"Enough to provide a minimum of 1:3 faculty: resident ratio."

3. *Number of part-time faculty (<1 day per week and ≥1 day per month)*: the overall opinion of the

Table II. Responses on education domain

Item	*What should an excellent orthodontic program have? (mean numbers)*
Average daily ratio of residents/ graduate students in clinic to faculty covering clinic	"No less than 2 full-time faculty members covering a clinical session" and "no more than 4 residents/ graduate students per faculty member covering a clinical session"
Lecture h/y (excluding seminar)	300 h
Seminar h/y	220 h
Clinic h/y/resident	1300 h
Should residents/graduate students be using the following to treat patients	100% to all of these treatment modalities
Fixed appliances from multiple manufacturers	
Use both self-ligating and conventional brackets	
Functional appliances	
Headgears	
Temporary anchorage devices	
Clear aligners	
Average number of new case starts assigned to each incoming resident/graduate student	≥70
Average number of active patients transferred from upper class to starting class	30
Average percentage of new assigned patients completed during residency	50% to 60%
New craniofacial patients started by each resident/graduate student	≥3
New orthognathic surgery patients started by each resident/graduate student	4
Average number of operatory chairs per resident/graduate student	Each resident/graduate student should have their dedicated chair at the minimum. 1.5 chairs per resident would be ideal
Number of dental assistants per resident/graduate student	1 to 4
Number of laboratory personnel per resident/graduate student	1 per program would be recommended (this is variable because some programs use outside laboratories)
Number of receptionists and secretaries per resident/graduate student	1 to 4

responders was that these part-time faculty members who cover the clinic <1 day per week and ≥1 day per month are essential to any orthodontic residency program. They enable residents/graduate students to have exposure to a variety of treatment approaches. The range mentioned for these part-time faculty members was from 0 to 20.

4. Total Full-time Equivalent (FTE) faculty (1.0 FTE = 2080 hours per year; 8 hours per day × 5 work days per week): all responders stated that the number of FTE faculty would be dependent on the size and duration of the program. The range suggested was from 3-10 FTE. Responders felt that at least a mean of 6 FTE would be required for an excellent orthodontic program. Some of the open-ended responses included were as follows:

   "Depends on size of program. On average, 6 or more."
   "I think 5 FTE is a minimum… at least 3 need to be full-time, and the rest could be full or half time. I am not counting the affiliates in this. They might add another FTE over the course of the year."
   "Four to 6 FTE depending on size of class, duration of program and whether a pre-doctoral dental program is offered."

5. *Percent of American Board of Orthodontics (ABO)–certified full-time faculty*: the responses ranged from 50%-100% ABO-certified faculty. The general opinion was that an excellent program should have ≥80% of full-time faculty who are certified by the ABO.
6. *Percent of ABO eligible full-time faculty*: the responders mentioned that in an excellent orthodontic program, ≥80% of those who have not achieved ABO certification should be working toward obtaining certification.
7. *Number of full-time faculty trained as craniofacial orthodontists*: the responders stated that there must be "at least one" faculty member who is trained to provide craniofacial orthodontics. The range was from 0 to 3. Several stated that they do not have a full-time craniofacial faculty member, that there is no need for an "exclusive" craniofacial orthodontic faculty, and the number should depend on the

needs of program and population. One program recommended a "shared faculty" collaborating with multiple institutions. Some of the open-ended comments were as follows:

"I don't know if they need to have formal training, but at least 1 has to have significant/meaningful clinical experience."
"Collaborate with other institutions, shared faculty."
"Depends on the needs of the facility and the surrounding population. Great resource but I don't think that it should be a 'requirement."
"Depends on the [craniofacial] experience provided by the program. We have XXXX Children's hospital close-by, but we also have 2 CF orthodontists on our faculty."
"Zero to 1 depending on the program/education of the orthodontist/faculty; an orthodontist/faculty may be able to provide adequate/similar help/supervision/educational instruction/research mentoring in this field compared to a craniofacial orthodontist depending on education."

7. *Average number of years post-residency (following completion of residency program) clinical experience for full-time faculty*: the responders mentioned that the average number of years of experience of full-time clinical faculty in an excellent program should be approximately "12 years." The range was from 2 years to "no limit" (25 years was the upper limit of captured quantitative responses).

Responses from education domain

The summary of responses to items assessing the "Education" domain are presented in Table II.

1. *Average daily ratio of residents/graduate students in the clinic per faculty covering clinic*: the mean numbers mentioned were "no more than 4 residents/graduate students per faculty member covering a clinical session." The average daily ratio of the responders ranged from 1.5 to 8. Some of the open-ended responses were as follows:

"The ratio should never exceed 3/1 for the 'beginner' or 'intermediate' learner (1 or 2 years training). I would be 'intermediate' learner (1 or 2 years training). I would be learner (who I consider has 2.5 or more years in training)."
"Three to 4 faculty: 21 residents, (looking at number of faculty per clinical session may be more telling than ratio)."
"Never less than 2 faculty members."

2. *Lecture hours per year provided to residents/graduate students (excluding seminar)*: the range was from 25-600 hours per year. The overall mean was 300 hours per year.
3. *Seminar hours per year (eg, treatment planning seminars)*: the range was from 52-624 hours per year. The data distribution was skewed. The overall recommended mean was 220 hours per year.
4. *Clinic hours per year per resident or graduate student*: the responses were wide-ranging and depended on the duration of the program, number of days in clinic, duration of clinical sessions. Overall, the mean from the responders was 1300 resident clinic hours per year.
5. *Treatment of patients with different techniques (fixed appliances with multiple manufacturers, self-ligating and conventional twin brackets, functional appliances, headgears, temporary anchorage devices, and clear aligners)*: all responders mentioned that "residents/graduate students should treat patients using various treatment modalities."
6. *Average number of new patients (case starts) assigned to each incoming resident/graduate student*: the number of new patients assigned ranged from 40-120 new case starts. The mean was 70 new case starts per resident/graduate student.
7. *Average number of active patients transferred from upper class to starting class*: the number of transfer patients suggested ranged from 10 to 100, which was dependent on the duration of the program. The mean number of transfer patients considered appropriate by responders was 30.
8. *Average percent of new assigned patients (case starts) completed during residency*: the percent of new assigned patients completed during a residency ranged from 20% to 90% and was dependent on the duration of the program. Overall, the responders mentioned that residents/graduate students should complete 50% to 60% of newly assigned patients.
9. *New craniofacial patients started by each resident/graduate student*: the range was broad—from 1 to 15 craniofacial patients. One significant open comment made by a responder was as follows: "treating craniofacial patients is difficult in a post-graduate orthodontic residency; I strongly believe that once a resident graduates he/she should go

Table III. Responses on resident, graduate student, and alumni domains

Item	*What should an excellent orthodontic program have? (mean numbers)*
Percentage of residents/graduate students passing written ABO examination over the last 5 years	100%
Percentage of residents/graduate students becoming ABO certified over the last 5 years	60%
Percentage of theses published in peer-reviewed journals	45%
Percentage of resident/graduate students presenting their research at meetings over the last 5 years	50%
Research awards over the last 5 years	≥2
Percentage of residents/graduate students receiving external funding over the last 5 years	10%
Is all radiographic and photographic imaging digital and is cone-beam computed tomography imaging available (%)	100%
Percentage of living alumni who contribute financially over the last 5 years	50%
Alumni donations to department over the last 5 years	$500,000+

and take a craniofacial fellowship. Residents should rotate in a craniofacial center."

10. *New orthognathic surgery patients started by each resident/graduate student*: the range from the responders was from 1 to 10 orthognathic surgery patients. Some of the open-ended responses were as follows:

    "Starting is not as important as diagnosing and treatment planning them, but my number for managing orthognathic cases is 10."
    "Three cases. I strongly believe that the more surgical cases treated during residency, the better. The problem that we face is that insurance companies do not cover orthognathic surgery, making very difficult for patients to accept a surgical-orthodontic option surgery as they did 30 years ago."

11. *Average number of operatory chairs per resident/graduate student*: the responders mentioned that residents/graduate students in an excellent orthodontic program should have their own dedicated chair at the minimum but that 1.5 chairs per resident would be ideal.
12. *Number of dental assistants per resident*: the responders mentioned that there should be 1 dental assistant per 4 residents/graduate students. The reported range was from 1 dental assistant per 1 resident/graduate student to 1 dental assistant per 7 residents/graduate students.
13. *Number of laboratory personnel per resident*: the mean response was 1 laboratory personnel per program. However, this number was variable because some programs use outside laboratories and outsource.
14. *Number of receptionists and secretaries per resident/graduate student*: the responders stated that there should be 1 receptionist and secretary per 4 residents/graduate students. The reported range was very variable because several programs tended to use shared personnel.

Responses from residents/graduate students and alumni domain

The summary of responses to items assessing this domain are presented in Table III.

1. *Percent of residents/graduate students passing written ABO examination (last 5 years)*:most responders stated that 100% of residents/graduate students should pass the written ABO examination. The range was from 95% to 100%. A few of the open-ended responses were as follows:

    "All, should be mandatory."
    "If every program is using this as an outcomes assessment, shouldn't it be 100%?"

2. *Percent of residents/graduate students becoming ABO certified (last 5 years)*: the responders felt that *at least 60%* of residents/graduate students should obtain ABO certification. The range was from 10% to 100%. Some of the open-ended responses were as follows:

    "Not critical. If and when board certification becomes necessary as it is in medicine, then 100%."
    "Not easy to control, ideally more than 50%."

"I would suggest that a goal of 75% is a good way to start."

3. *Percent of theses published in peer-reviewed journals (last 5 years)*: the responders stated that *45%* of theses should be published in a peer-reviewed journal. The range was from 4% to 100%.
4. *Percent of residents/graduate students presenting their research at meetings (last 5 years)*: the responders hoped that 50% of residents/graduate students could present at meetings. The range was from 4% to 100%. Some of the open-ended responses were as follows:

   "One hundred percent should participate at some or other dentally related meeting (dental school research day); less participation a reality further away (travel burden) from program."
   "In order to put more 'teeth' into the 'research' standard of CODA [Commission on Dental Accreditation], shouldn't the answer be >50-75%. Also, wouldn't that give us all more thought-provoking information to look at when we go to meetings besides the Exhibit Hall?"

5. *Total number of AAO resident research awards (last 5 years)*: the respondersconcluded that ≥2 resident research awards should be a goal.
6. *Is all radiographic/photographic imaging digital and is cone-beam computed tomography imaging available? (yes/no)*: the responders were all unanimous in that radiographic/photographic digital imaging and cone beam computed tomography imaging should be available.
7. *Percent of living alumni who have contributed financially to the department in the past 5 years*: at least 50% of living alumni should be regular financial contributors to the department.
8. *Residents/graduate student receiving external funding*: the responders stated that ≥10% of residents/graduate students should be recipients of external funding to conduct their research during the last 5 years.

DISCUSSION

What contributes to an excellent, top-tier, orthodontic residency program? The results of this survey provide many quantified features which define one. We hope that this information will allow each of us to strengthen our individual programs, and we hope that this information will be of value to candidates as they interview programs.

We wish to state that we were delighted by the support and encouragement we received from program chairs/directors during our data collection. The future of orthodontic care of our patients lies in the hands of our orthodontic residents, and the future of our residents lies in the hands of our educators. Not all program chairs/directors chose to participate in this survey, but the majority of them did. We found those who did participate to be keenly interested in seeking what is best for our patients, students, and specialty.

Surveys of health professionals typically tend to have low response rates.[5-7] However, our study had an exceptionally good response rate of 63%, which indicates that the orthodontic educators evinced a high interest in the present study.[8] This response rate suggests that the present study findings are representative of the majority of orthodontic residency programs. When we examined the geographic distribution, duration of the residency program, and the number of residents in a program, we did not find any systematic differences and biases between responders and nonresponders.[1]

The present study's findings should be interpreted with the inherent limitations of descriptive studies and content analyses of open-ended questions in perspective.[9,10] No tests of associations were conducted as we do not have any previous benchmarks on the subject. What the study identifies is a mix of features that are perceived by the responding program chairs/program directors to represent an excellent orthodontic program. We did not attempt to prove any "causality" because our study design is not suited to establish a "cause and effect relationship." This study did not seek opinions of full-time faculty members or part-time faculty members in an orthodontic residency program. Only the program directors/chairs were contacted to participate in the study. There could be differences in perceptions of what constitutes an excellent orthodontic program between the program leadership (chairs/program directors) and faculty members (full-time and part-time).

Furthermore, the perceptions of current residents/potential applicants to orthodontic residency programs could also be different. These could be areas of further exploration by future studies. We conducted a nationwide survey of orthodontic program leadership, and we could not standardize the definition of some variables such as what constitutes a "full-time" vs "part-time" position. For example, at our institute (University of Iowa), a faculty is deemed "full-time" if they work within the institute for all 5 working days in a week. Alternatively, there are several institutes where 3 or 4 working days is deemed "full-time." Our survey did not examine

unquantifiable variables such as "what contributes to the intellectual life of a resident and student?" or quantifiable variables such as "business balance sheet," and "resident production and income generated." Examining these factors was beyond the scope of our study.

Furthermore, the opinions and perceptions of nonresponders could be different from the responders. Finally, we presented the mean and ranges for the responses to different metrics. It is evident that the ranges were wide and could be dependent on a multitude of factors such as class size, duration of the program, and caseload.

Although unquantifiable features such as faculty passion and dedication to teaching play a vital role in defining the quality of residency education, our results indicate that determinable features also exist that are fundamental to the definition of an ideal excellent orthodontic residency program. The present study identifies such features which fell into 3 broad domains: faculty, education, and resident/graduate student/alumni (Figure).

These quantified features exceeded the minimum standards required by the CODA for accrediting residency programs.[3] It should be noted that what CODA determines are "minimum" standards while the present study identified what programs should be striving for to achieve "excellence" in education and service. For example, CODA standards do not explicitly specify the number of patients a resident should start/debond, the number of full-time/part-time/adjunct faculty members a program should have or awards/publications/research exposure of residents. The present study provides quantitative estimates of such features that are essential for an orthodontic residency program of excellence.

Although it would be unrealistic or difficult to expect all orthodontic residency programs to exhibit all the characteristics identified in the present study, every residency program in the country, and worldwide, should be striving toward achieving excellence and setting new benchmarks for the same. There are certainly some features that most programs can strive to achieve or surpass. For example, our study findings indicate that our respondents consider peer-reviewed publications of high importance. They considered 45% (overall average) of theses should result in peer-reviewed publications, and 50% of residents/graduate students should present their research findings in a national meeting. A survey conducted by Bruner and colleagues[11] examined the residents' perspective of graduate orthodontic education and showed that 71% of residents wanted to publish their research in a peer-reviewed journal.

In contrast, there are probably some features that are difficult or impossible to accomplish for some programs. For example, some respondents indicated that, on average, 3 patients with craniofacial anomalies should be started by each resident/graduate student. Such a number cannot be realistically achieved by all programs because the craniofacial caseload in an orthodontic residency program is dictated by factors that go beyond the control of program leadership. Programs located in geographic locations with ready access to specialized craniofacial centers are more likely to have a higher caseload as opposed to programs that are located in areas without a craniofacial center or in regions where there are not too many patients with craniofacial anomalies. One responder suggested that in such situations, having a collaborative model with a "shared craniofacial orthodontic faculty" or a "craniofacial resource center" could benefit several residency programs.

Despite the above limitations, the present study adds much to the orthodontic residency education literature. Previous studies on orthodontic residency education have explored demographic characteristics of orthodontic faculty members, orthodontic residents, career plans of residents, techniques and treatment philosophies taught and followed in various orthodontic programs, resident evaluation of programs, and crisis in orthodontic education.[11-17] To our knowledge, there is no empirical evidence to date on what features and factors are associated with an excellent orthodontic residency program. This study presents a descriptive overview of such findings for the first time.

CONCLUSIONS

Out of the 62 programs contacted, 39 programs responded to our survey. Based on the responses of the 39 programs, the present study identified certain features within 3 broad domains (faculty, education, and resident, graduate student, and alumni) that educators affiliated to these 39 orthodontic residency programs feel are ideal for a top-tier orthodontic program. These features are as follows:

1. An adequate number of full-time clinical orthodontic faculty, each of whom provides 1 day per week clinic coverage. The "mean" of all respondents was 4, and the range was 1-6; a healthy mix of part-time faculty members with $\geq$1 full-time faculty member who monitors every clinical session; 80% full-time faculty members who are ABO certified; a craniofacial faculty member; 4 residents/graduate students per each faculty member who covers a clinical session.
2. Exposure to a wide range of treatment modalities and appliances.
3. Approximately 70 new case starts per resident/graduate student (50%-60% of patients who are started are debonded by the starting resident/graduate student).

4. Patients with craniofacial anomalies and orthognathic surgery patients should be started by each resident/graduate student.
5. 1.5 operatory chairs per resident; 1 dental assistant per 4 residents; 1 laboratory person; 1 receptionist and secretary per 4 residents.
6. 100% of residents/graduate students successfully completing ABO written examination upon graduation; 60% of residents/graduate students obtaining ABO certification within 5 years of graduation; 50% of residents/graduate students presenting at national meetings would be ideal; and 50% of living alumni contributing financially to the department during the past 5 years.

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